

2005 Monitoring Summary



Black Creek at Noccalula Road (Etowah County) (34.04118/-86.01998)

BACKGROUND

In 2005, the 2.1 mile segment of Black Creek from Lake Gadsden upstream to US Highway 431 was classified for *Agriculture & Industry (A&I)* uses. As mandated, the Alabama Department of Environmental Management (ADEM) conducted a Use Attainability Analysis (UAA) study to determine if the reach could reasonably be expected to attain water quality criteria consistent of Alabama's *Fish & Wildlife (F&W)* use classification, which achieves the Clean Water Act's interim "Fishable/Swimmable" goal. Black Creek at BLKE-4 was selected as an upstream control during this study.

Additionally, the site was also sampled as part of the 2005 Alabama, Coosa, and Tallapoosa (ACT) Basin Assessment. The objectives of this project were to assess the biological integrity of each monitoring site and to estimate overall water quality within the ACT basin.

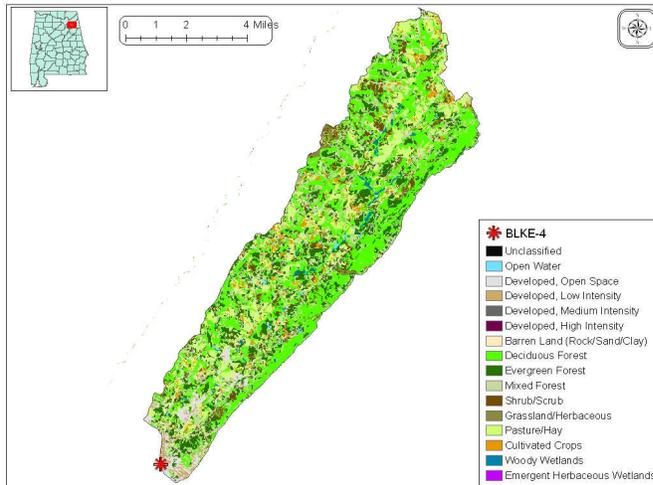


Figure 1. Sampling location and land use within the Black Creek watershed at BLKE-4.

WATERSHED CHARACTERISTICS

Watershed characteristics are summarized in Table 1. Black Creek at BLKE-4 is located in Gadsden, Alabama. Land cover within the watershed consists of forest (63%), with some pasture, shrub, and development. The watershed is located in the *Southern Table Plateaus* subcoregion and has a drainage area of approximately 54 square miles. As of September 8, 2009, seven NPDES permits have been issued within this watershed.

REACH CHARACTERISTICS

Black Creek at BLKE-4 is a medium-gradient stream dominated by bedrock substrate, which naturally limits benthic habitat and is susceptible to scouring during high flow events (Table 2). Overall habitat quality was rated as *sub-optimal*, but the riparian buffer condition was rated as *poor* (Table 3).

Table 1. Summary of watershed characteristics.

Watershed Characteristics		
Drainage Area (mi ²)		54
Ecoregion ^a		68d
% Landuse		
Open water		<1
Wetland	Woody	1
	Emergent herbaceous	<1
Forest	Deciduous	34
	Evergreen	14
	Mixed	15
Shrub/scrub		6
Grassland/herbaceous		2
Pasture/hay		16
Cultivated crops		3
Development	Open space	6
	Low intensity	1
	Moderate intensity	<1
Barren		<1
Population/km ² ^b		34
# NPDES Permits ^c	TOTAL	7
	Construction Stormwater	6
	Municipal Individual	1

a. Southern Table Plateaus

b. 2000 Census Data

c. #NPDES permits downloaded from ADEM's NPDES Management System database, 18 Sep 2009

Table 2. Physical characteristics of Black Creek at BLKE-4, May 19, 2005.

Physical Characteristics		
Width (ft)		40
Canopy cover		Open
Depth (ft)	Riffle	0.5
	Run	1.3
% of Reach	Riffle	15
	Run	85
% Substrate	Bedrock	75
	Boulder	5
	Cobble	5
	Gravel	5
	Sand	5
	Silt	3
	Organic Matter	2

BIOASSESSMENT RESULTS

Benthic macroinvertebrate communities were assessed using ADEM's Intensive Multi-habitat Bioassessment methodology (WMB-I). This measures taxonomic richness, community composition, and community tolerance to assess the overall health of the macroinvertebrate community. Each metric is scored on a 100 point scale, with the final score being the average of all metric scores. The results indicated a rating of *poor* for the macroinvertebrate community's condition.

Table 3. Results of habitat assessment of Black Creek at BLKE-4, May 19, 2005.

Habitat Assessment	% Maximum Score	Rating
Instream habitat quality	60	Sub-optimal (59-70)
Sediment deposition	85	Optimal (> 70)
Sinuosity	83	Sub-optimal (65-84)
Bank and vegetative stability	80	Optimal (≥75)
Riparian buffer	30	Poor (<50)
Habitat assessment score	158	
% Maximum score	66	Sub-optimal (59-70)

Table 4. Results of macroinvertebrate assessment conducted in Black Creek at BLKE-4, May 19, 2005.

Macroinvertebrate Assessment			
	Results	Scores	Rating
Taxa richness measures		(0-100)	
# Ephemeroptera (mayfly) genera	6	50	Fair (47-70)
# Plecoptera (stonefly) genera	1	17	Poor (16-31)
# Trichoptera (caddisfly) genera	6	50	Fair (45-66)
Taxonomic composition measures			
% Non-insect taxa	6	78	Good (74.2-87.1)
% Non-insect organisms	1	98	Excellent (>97)
% Plecoptera	0	0	Very Poor (<6.56)
Tolerance measures			
Beck's community tolerance index	7	25	Poor (20.2-40.7)
WMB-I Assessment Score	--	45	Poor (24-48)

WATER CHEMISTRY

Results of water chemistry analyses are presented in Table 5. When possible, in situ measurements and water samples were collected monthly, semi-monthly (metals), or quarterly (pesticides, atrazine, and semi-volatile organics) during March through October of 2005. Parameters were compared to established criteria where possible. Where criteria are not established, median values were compared to the 90th percentile of data from least impaired reference reach streams in ecoregion 68d. The data is analyzed to determine the presence of any stressors to the biological community. Median nutrients, total and dissolved solids, and chlorides were similar to background conditions based on the 90th percentile of reference reach data collected in ecoregion 68d. A thunderstorm prior to and during the April sampling event led to a higher than normal flow.

Table 5. Summary of water quality data collected March-October, 2005. Minimum (Min) and maximum (Max) values calculated using minimum detection limits (MDL) when results were less than this value. Median, average (Avg), and standard deviations (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Parameter	N	Min	Max	Med	Avg	SD	Q
Physical							
Temperature (°C)	9	10.0	27.0	23.5	21.3	5.7	
Turbidity (NTU)	9	2.6	19.5	7.3	7.9	4.9	
Total Dissolved Solids (mg/L)	7	16.0	88.0	38.0	47.3	29.2	
Total Suspended Solids (mg/L)	7	4.0	15.0	12.0	10.3	3.8	
Specific Conductance (µmhos)	9	40.7	89.4	55.9	58.3	16.8	
Hardness (mg/L)	5	12.6	37.6	13.8	18.5	10.8	
Alkalinity (mg/L)	7	5.6	41.1	10.3	13.3	12.5	
Stream Flow (cfs)	6	1.4	204.1	56.1	72.8	74.8	
Chemical							
Dissolved Oxygen (mg/L)	9	7.7	9.6	8.6	8.7	0.6	
pH (su)	9	6.7	7.9	7.3	7.3	0.4	
Ammonia Nitrogen (mg/L)	7	< 0.015	<0.015	0.008	0.008	0.000	
Nitrate+Nitrite Nitrogen (mg/L)	7	< 0.003	0.171	0.144	0.116	0.061	
Total Kjeldahl Nitrogen (mg/L)	7	< 0.150	0.489	0.075	0.167	0.153	
Total Nitrogen (mg/L)	7	< 0.166	0.646	0.225	0.283	0.164	
Dissolved Reactive Phosphorus (mg/L)	7	< 0.004	0.028	0.013	0.013	0.008	
Total Phosphorus (mg/L)	7	0.017	0.066	0.044	0.042	0.016	
CBOD-5 (mg/L)	7	1.3	2.1	1.7	1.7	0.4	
COD (mg/L)	1	<		<	2.0		
Chlorides (mg/L)	6	4.0	6.9	4.2	4.7	1.1	J
Biological							
Fecal Coliform (col/100 mL)	7	7	260	87	128	100	H

J= estimate; N= # of samples; H=holding time exceeded;

SUMMARY

Although bioassessment results indicated the macroinvertebrate community to be in *poor* condition, habitat assessment results suggest that the community may be affected by bedrock scouring caused during high flow events. Instream temperature, dissolved oxygen, and pH measurements met *F&W* criteria throughout the 2005 sampling season.

FOR MORE INFORMATION, CONTACT:
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